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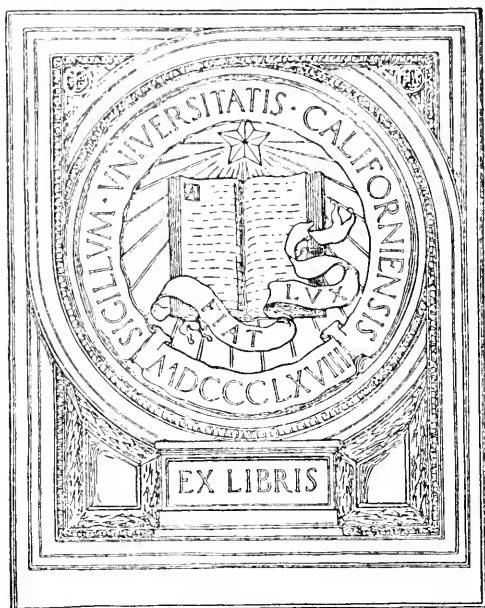


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Some Features of Rate Fixing

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Engineers and Architects Association
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Some Features of
RATE FIXING
FOR ELECTRIC PUBLIC SERVICE PROPERTIES

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Paper presented to Engineers and Architects Association
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April 18, 1912

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Some Features of Rate Fixing For Electric Public Service Properties

By **GEORGE L. HOXIE, Ph. D.***
 Mem. A. S. M. E. and A. I. E. E.

Rate-fixing is one of the newer engineering problems. It is true that rate-fixing commissions have been, and are, largely composed of lawyers, but the members of all of these commissions have found it necessary to rely largely upon their engineering experts, and it seems to the writer entirely probable, as well as desirable, that the engineering profession should in the future have an increasing share in handling rate-fixing matters. It seems probable that for some time to come there will be a steadily increasing number of engineers either employed directly by commissions, or employed by public service corporations in connection with the work of commissions. It is therefore important that engineers should devote some attention to the problems of rate-fixing.

It is not the intention of the present paper to present solutions of any of the various questions that are continually arising in rate-fixing, or even to enumerate all of the important matters connected therewith, but it is the author's aim to speak of some problems in a very general way, in the hope that there may be a full discussion, leading also to a preparation of other papers by other authors, to the end that the engineering profession may have the large influence that it should have, upon the working out of the principles that are to guide future rate-making commissions, and may also guide the courts that will pass upon their determination. The writer is not one of those who

believe that the first few court decisions, covering a new field, should form precedents binding the human race for all time. Without criticising any court or any decision, it seems to the author that the whole subject of the relation of public utility corporations to the public is so unsettled that progress will be made by each contributor stating freely what he thinks ought to be, substantially without regard to past court decisions, or even to existing laws. The present paper will be wholly confined to a discussion of rate-fixing as applied to electric public service properties.

Methods and rules for the appraisal of property, and the principles governing decisions on the revenue property is entitled to earn, are not yet generally agreed upon. The questions involved are quite new, both to engineers and to lawyers, and perhaps it may be said without disrespect that they are also new to judges. It therefore happens that there have already been conflicting court decisions, and probably there will be in the future a good many more such decisions and perhaps greater conflicts than have yet become apparent. Eventually of course there must come a general agreement on questions that are now exceedingly controversial. Such agreement can come only after all of the matters about which there are now differences of opinion have been discussed so fully that the fallacies of the wrong notions and the correctness of the right notions (whatever they may be) become at last apparent to all. The judges who now decide things are perhaps in the most difficult position of any of the parties involved. A judge must decide on what is brought before him and has little or no time for digging out ideas of his own, or for the

*Of the firm of Hoxie & Goodloe, Engineers, of New York and Los Angeles. A paper to be read at the April meeting of the Engineers and Architects Association of Southern California on April 18, 1912, at Hollenbeck Cafe.

bringing out of points perhaps not in the minds of the counsel on either side. Counsel also are largely dependent upon their engineers. Engineers therefore should not permit their ideas to be too much circumscribed by early judgments but should bear their part in the making of that public opinion which when fully matured will eventually be expressed by law-makers and courts. There has already been a considerable amount of published discussion of various features of rate-making, such as the proper allowances to be made for depreciation; the correct methods of making appraisals of physical property; what constitutes a company's investment; going value, etc. No particular originality is claimed for any of the things herewith presented.

Principles

Rate-fixing is designed to accomplish three objects. First, that the people served by a public utility shall pay the lowest rate possible, consistent with efficient service and a proper return on the investment of the corporation. Second, that each class of consumers pay its proper proportion of the total revenues. Third, that there shall be no discrimination between individual consumers of any given class.

The third problem is not difficult. It is only necessary to pass laws forbidding discrimination and to see that those laws are not evaded. There is no difference of opinion as to the desirability of preventing discrimination, and there is little difference of opinion as to what constitutes discrimination.

The other two problems are very difficult. Taking up the first question, it must be determined primarily what is a "proper return," and second, what constitutes "investment." We will consider to begin with the case of a successful public utility. (It is obvious that a utility that was not needed by the people served, or one that is operated at such cost that the people served cannot afford to pay a proper return on the cost, cannot be subjected to the same rules that apply to a successful public utility.) The consumers served by a successful corporation can afford to pay, and should pay, annually a sum of money sufficient to cover:

- (a) The usual rate of interest on safe investments.
- (b) An additional sum to compensate for whatever special risk the business of the public utility may involve; and
- (c) Such excess profits as are necessary to induce capital to engage in the business.

Item (a), or the rate of interest on safe investments, is to be such a rate as may be paid by savings banks or yielded by high-grade bonds, that is, a rate that would be paid on money invested with practical safety

and where the capitalist is not called upon to exercise much personal supervision over his investment after having once made it.

Item (b) will vary with the character of the business, the character of the community served, the length of time the utility has been established, the probability of future competition, etc. Item (b) may be as little as one per cent or it may be very much more. For a settled utility, necessary to the community served, well and economically managed, and not unpopular with the general public, the special risks inherent in the business are small, and are such as would be included in the possibility of strikes, either of workmen or of politicians, the possibilities of new inventions making parts of the plant obsolete, or change in the attitude of the public leading to hardship, or possible bad management or dishonesty in the future, etc. It is hard to imagine a public utility that must not face these and similar possibilities and therefore insurance should be provided against such possibilities, such insurance to take the form of a greater return than a savings bank or high-grade bond would make. The amount allowed must depend upon the judgment of the rate-fixing body but must also be in line with integrated judgment of investors, expressed by the prices of stocks in similar public utilities as compared with the different rates of return on such stocks. It should be pointed out that the stability given by proper public supervision, which rate-fixing implies, (such supervision for example as the state of Wisconsin and some other states now give to their public utilities) should, and in fact does, greatly diminish the risks of the business and therefore diminishes the rate that investors are willing to accept on stocks, or, otherwise expressed, operates to make public service securities more marketable.

Item (c), covering excess profits necessary to induce capital to engage in the business, is somewhat akin to item (b) and in fact the two items might be combined, yet there are some real differences and it has therefore been thought proper to include the third item, covering inducement. Capital is usually induced to engage in a business by a promoter. Item (c) may therefore be thought of as represented in part by promotion stock, or by the earnings of promotion stock. Usually, however, at least in the case of those few public service enterprises that are initially of considerable size, the inducement of the promoter's eloquence is not sufficient. The capitalist will not enter such an enterprise unless there is a real money inducement (or a reasonable expectation of such inducement) in excess of ordinary interest plus proper payment for risk. It must be remembered that the actual risk run by the capitalist, as meas-

ured up by a cold-blooded commission after the enterprise has been successfully established, and the apparent risk, as it first appears to the timid capitalist at a time when the whole project exists only in the brain of the promoter, are two very different things. If then the enterprise be one that the public needs, the public must be prepared to pay an inducement. This inducement may be in the form of a moderate return on stock partly water, or larger return on net investment, but it must appear to the capitalist to be reasonably certain or he will not engage in the business. The size of the necessary inducement must be a matter for the judgment of the commission. Public policy demands that it be as small as possible, but public policy also demands that full faith be kept with the capitalist in the matter of payment after he is fully committed and is helpless. The present tendency in some states is to cut down "inducement" to the point where many desirable enterprises cannot be financed. If similar rules applied all over the world, capital would be forced to accept them. As it is capital is very nimble, and goes where it can do best for itself. It follows that stagnation sometimes comes to a community as a result of actions taken with the best possible motives, and perhaps perfectly desirable and politic actions, could they only apply the world over.

The promoter as well as the capitalist must usually be paid. Where the enterprise grows from a small beginning the promotion charge is negligible. Where the enterprise is born full size the promoter should be allowed a reasonable percentage. The cost of promotion is a real cost. It is impossible to establish any large enterprise without promotion. It is true that it is sometimes possible to pay the promoter wholly in hope, yet in the long run promoters must be paid at least something in cash, or else public enterprises will lag and useful projects will fail of development. The value and necessity of promotion is very frequently disputed and probably the statement that the cost of promotion is a legitimate cost will provoke some criticism. The fact is however, that the stimulation of the promoter is necessary and in fact indispensable, to the organization of even the most useful projects. Item (c) may be taken care of either under the head of "What is Investment" or under the head we are now considering. In either case the final decision, expressed in dollars of capitalization, or expressed in present rate of return to be allowed, is and must be for some time to come, a matter for the judgment of a commission. Some day, it may be a long way in the future, or perhaps not far ahead, there may be an agreement upon exact rules for

the determination of items (b) and (c). For the present they must be fixed upon judgment.

What Is Investment

Investment may be in money, or in services. The latter is as real as the former. The fact that services have frequently been grossly over-valued has led to a feeling that the investment of services should not be permitted. This seems wrong. The services of the promoter, for instance, may usually best be paid in stock. This amounts to saying that the services of the promoter may be capitalized. The danger is of course that stock being sometimes simply a matter of the printing press, an excessive payment is made for promotion, and the public is thereafter charged with the necessity of paying dividends upon a large amount of water. Promotion stock in fact is not water unless it be issued to a greater amount than the actual services of the promoter justify.

In some cases the cost of promotion is paid by the consciousness of the promoter that he has performed a public service for the benefit of the community. This is not so rare as may be imagined. A conspicuous example is that of the Los Angeles aqueduct, now nearing completion. In connection with this enterprise a number of public-spirited gentlemen presented to the city the product of their imagination in conceiving the enterprise and of their labors in promoting it, which latter in this instance consisted of conducting a campaign that convinced the voting public that taxpayers' money should go into the proposition. By the ordinary standard of private enterprise the initiation and financing of such an enterprise would be considered well worth a very large sum of money provided the enterprise proved on completion to be financially successful. In this case, and in not a few similar cases, the promoters are in fact content with having accomplished the work, and in such public approbation as they may receive. The city in this case, or the private enterprise in some other cases, is the gainer.

In appraising a public utility just put together and ready to operate, the writer would include in the appraisal, besides figures representing the cost in place of each physical item, (cost of engineering, cost of insurance, etc.), also the exact cost of putting together the corporation, (cost of legal work, etc.), and besides these would include payment for the energy and initiative used on the scheme as a whole, under the head of "Cost of Promotion." All the items on the schedule added together would then be the true "Investment" when the entire plant stands ready to begin operation.

Investment is usually of two general classes, represented by bonds and by stock. It is the return made to stockholders that

is mainly effected by rate regulation. It is usual in cost discussions to consider the entire investment as if it were furnished by stockholders, which as a rule it is not. The return to stockholders made up as heretofore described as being savings bank interest, plus compensation for risk, plus inducement to engage in business, should only be paid on that part of the investment that carries risk with it, or in other words, should only be allowed on that part of the investment made by the stockholders.

It frequently happens that 75 per cent or more of the money required for a project is furnished by bond holders. For illustration let us assume that in order to sell its bonds an enterprise must pay a return of 5½ per cent on money received from the sale of bonds. This allows for some discount and commission on the usual 5 per cent bonds. If the proper return to stockholders on their part of the investment (sum of items (a), (b) and (c),) be set at 10 per cent, the average necessary return on the total investment, 75 per cent of which is represented by bond money costing 5½ per cent, and 25 per cent of which is money from stock which is to be allowed 10 per cent, becomes 6.25 per cent. In making such a division in any particular case the exact financing of the utility under consideration should not be used, as it is obviously unjust to penalize a company for having a high credit, and for being able to sell bonds bearing a low rate of interest to the extent of perhaps 80 or 90 per cent of the total cost of say a particular extension. It is obviously equally unfair to reward a company for having such poor credit that it may perhaps only be able to raise a quarter of its needed money from bonds and may be obliged to get from its stockholders the other three-quarters of the money needed. A commission should consider the general conditions under which similar public utility companies of ordinarily good standing can issue and sell bonds. The commission may then adopt an average credit standard and may reasonably permit a company that exceeds this standard to profit by so doing. It must of course be considered that an enterprise just being established and presumably not being able to raise a very large percentage of its money from bond issues, must offer correspondingly good inducements to stockholders, as their risk and the difficulty of getting their money increased.

Franchise Value

In most rate-fixing investigations the franchise itself is not permitted to be regarded as an investment on which earnings are made. This is not necessarily the case, however, as it frequently costs money to get a franchise, and the terms of the franchise frequently involve an annual expense to the company. For example it is

not uncommon for an electric lighting company as a condition of its franchise to engage to supply electricity to various public buildings free of charge, or the company may as a condition of its franchise engage to perform street lighting at an especially low rate. Where any of these elements are found the franchise represents either a real legitimate initial expenditure, or a constant annual expenditure, and in either case the franchise may reasonably be regarded as capital on which revenues must be earned. In the latter case the expenditures may with equal justice be charged instead as operating expenses, if for any reason this is preferred as a matter of bookkeeping.

Going Value

Assuming that we have decided what constitutes "investment" for an enterprise just completed and ready to operate; what is "investment" for "going concern?" It is rather obvious that a completely equipped utility company ready to operate, but having no customers, has a different value from the same utility a little later when we may assume that its total product is being sold at a remunerative figure. The difference in value between a company without customers and the same company under full operation may reasonably be considered as represented by the cost of putting the company into the latter condition; in other words, the cost of establishing the business. This sum is represented by early losses, or by the failure to earn proper profits, in the early years of operation. Some caution is necessary in arriving at a figure for "going value" on this basis and it cannot be contended that an unsuccessful company, or a company which was not needed by the community when it was put into operation, or in other words, where the enterprise could not reasonably have been expected to be a financial success, should be permitted to capitalize losses over a long series of years even though such losses in fact occurred. It is assumed in the discussion up to the present point that we are dealing with successful, or reasonably successful, utilities, and it may be readily seen that except in very rare instances even the most successful public utility must spend time and money in creating business. Such expenditures are really necessary costs, paid in money or its equivalent, and worth money or its equivalent, and therefore are legitimate items going to make up "investment."

Depreciation

There is a wide difference of opinion as to proper methods of figuring depreciation and even as to what constitutes depreciation. As these matters have already been considerably discussed before the various technical bodies, it is not the intention of the present paper to consider the matter of depreciation in detail. It will therefore be

assumed that depreciation is figured on a straight line basis, using the assumed useful life of the various items making up the total investment as a basis for determining the yearly charge against each item to cover depreciation. It is also assumed that depreciation has only one value at a given moment for a given item. The items of cost of franchise if any, and the costs of general engineering, superintendence, insurance, law, promotion, going value, etc., should be subject to a depreciation charge as well as are the items covering actual physical property. This means, of course, that such intangible costs as those just enumerated are to be written off, or amortized, in the course of time. Such costs are assumed to be incurred but once, and when fully paid back from a depreciation fund it may logically be assumed that they have been written off and removed from the capital account. The application of depreciation to intangible items of this sort may be justified logically on theoretical grounds but without entering upon any theoretical discussion it will probably be generally conceded that as a practical matter it is advisable to amortize intangible costs when, and as soon as, possible.

Supervision of Depreciation Fund

The rate-making body should have supervision over the accounting and bookkeeping, in connection with expenditures from any fund collected for the purpose of balancing depreciation. A well-managed corporation should have the fullest power to decide upon such expenditures, since the officers of the corporation, if competent, will ordinarily be in a better position to form correct judgment of how money should be spent than will any supervising commission. The fund, in the discretion of the corporation's officers, should be permitted to be used for replacing worn-out machinery or buildings, for buying needed real estate for the future, for building entirely new plants, extending lines, or in such other legitimate expenditures as the officers in charge may deem most beneficial to the corporation's present and future business. The only restriction on such expenditures should be merely such as will satisfy the commission that wise judgment is being exercised.

The bookkeeping in connection with depreciation expenditures should be wholly under the control of the commission, that it may be made certain that no part of the plant, built with depreciation money, is capitalized, even though the depreciation fund proves in the course of several years, to have been larger than was really necessary. This, of course, applies to additions made under regulation and not to additions made out of surplus earnings before the advent of rate regulation.

It has been suggested that a competent commission would revise the depreciation allowances from year to year, so as to keep the fund in the long run at very closely the exact equivalent of the depreciation that has occurred. This is one of those things that look easy, but in fact are practically impossible to carry out. If the depreciation allowed be too large to begin with, it is likely to be too large continually, and if, as the writer believes best, the fund may be invested in new construction, it must be under the general supervision of the rate-making commission, or injustice to the public is likely to result.

Influence of History and Capitalization

It is argued by some that capitalization should be the controlling element upon which to base values for rate fixing purposes. At the least this is said to be correct for a property that is sufficiently successful to earn reasonable dividends upon its capitalization before the advent of rate-fixing. There is a certain element of reason and justice in the claim in its latter form, since it is undoubtedly true that the public bears some responsibility for what has been permitted to be done in the past, and investors who have bought stocks and bonds in good faith, upon the assumption that conditions were stable, are entitled to some consideration. It is difficult, however, to find any justification for a fixed rule that would base rates upon capitalization, or upon earnings prior to rate regulation. It seems to the writer that all rates should be based primarily upon appraisal of property, including all the tangible and intangible items heretofore mentioned in the final value of the property. It also seems reasonable that depreciation should be subtracted on all items, and that past history should be gone into to determine to what extent if any the cost of intangible items, or at least such of them as would not be duplicated for a newly organized competing corporation, may have been covered by excess earnings, and may therefore be considered as written off. Certain physical items such as real estate, will frequently be appraised at more than original cost, and if an appreciation in one class of property is to be allowed, it seems illogical to fail to consider depreciation on another class of property.

As we are still considering what we have termed successful corporations it is not necessary now to consider the case where past earnings have not been sufficient to create a proper depreciation fund. This case will be briefly treated under another head.

If after determining a proper income to be allowed, it be found for a particular corporation that its stock and bonds have enjoyed a wide market, and have been generally distributed and would be considerably depreciated by the revenue proposed to be

allowed, then it seems to the writer that a commission may reasonably allow weight to such a state of facts. On the one hand a strict ruling will bring an immediate loss upon the investor, and on the other hand if the strict ruling be not followed a loss is thrown upon the general public, by collecting from them higher rates than are necessary. A newly organized commission might very reasonably compromise by fixing a term of years at the end of which strict rulings will generally apply, and in the meantime gradually lower the rates during said term. Such a course does not correct past injustice, but it divides the losses resulting from injustice between the stockholder who has made an unfortunate investment, and the public that permitted the unfortunate conditions to exist.

Detail of Rates

In the writer's opinion the revenue collected should be based ultimately upon the "present value" (reproduction cost, less straight line depreciation) of all physical and non-physical items of property necessary to the service sold. The revenue should be sufficient to cover operating expenses; depreciation charges; and income upon "present value."

It would seem at first sight that if an agreement be once reached on total revenue to be collected the rate problem would be practically solved. Such is by no means the case. It is hardly too much to say that some of the hardest problems still remain. These problems do not seem to be of such a nature that any general solution may be indicated, but they are well worth discussion. For the purposes of the present paper it will not be attempted to go much further than indicate a few of the things that must be considered.

For illustration, let us consider the case of a company whose sole business is the manufacture and sale of electricity. There are many public service enterprises that handle a far more complex business, but this will suffice for illustration. It would probably be found that such a company is retailing electricity in small quantities for domestic purposes; that it is supplying energy for small motors over a wide area; current for small stores, scattered through the residence districts of town; lighting for apartment houses over quite a wide area; lighting for hotels and department stores in the business districts; street lighting, probably of at least two kinds; current for electric elevators; current for manufacturing; current for pumping water, and probably also current for operating electric railways.

Not only is every one of the classes of service mentioned supplied at different cost to the company, considering that particular class of load alone, but the cost of supplying each class is vitally affected by the pres-

ence of the other classes, i.e., by "diversity factor." Engineers well understand these things, but the general public does not, and so another and quite important factor enters into rate-fixing, namely the attitude of a more or less ill-informed public. One of the most valuable features of continual discussions among engineers is that gradually the general public hears in one way or another of what is going on, and in the course of time becomes less ignorant, or even, at the end, may become well informed.

Those engineers who have happened to be connected with rate-fixing matters where the rulings of a commission have been preceded and followed by general public discussion, in the newspapers and on the platform, will realize vividly the necessity for considering the influence of public opinion, if anything useful really is to be accomplished.

To return to the discussion of classes of service, it will almost invariably be found that the public have no proper conception of the necessary difference in cost per K.W.H. between supplying a householder with lighting current say to the amount of 20 to 30 K.W.H. per month, current being delivered around 100 volts, and the current measured being used a short time per day while an unmeasured all day loss goes on in the customer's individual transformer; and the cost per K.W.H. of supplying say 500,000 K.W.H. per month, at say 10,000 volts, to a railway company. Of course it will be generally admitted that there must be a reasonable difference between wholesale and retail price, but one continually finds a comparison being made between the prices of coal and electricity at wholesale and retail; and in communities where the water supply is metered, the difference between the wholesale and retail price of a cubic foot of water is always brought into the argument. It is maintained by some, and to most people very plausibly, that the wholesale and retail ratio in the case of electricity should not be very different from the wholesale and retail ratio in the case of coal or water. It is rarely pointed out, however, that a company is fairly lucky if a kilowatt hour at 100 volts, measured inside a customer's residence, does not mean pretty nearly two kilowatt hours measured back on the high tension line.

There have been an almost endless number of schemes of rates based upon the notion of taking proper account of the customer's load factor, and of bringing the charge more closely into line with the actual cost of the particular service charged for. It is obvious enough to engineers that rates ought to take account not only of load factor, but of time of day when the customer's demand is greatest. Here again the attitude of the public makes it difficult to use any system that may look a little complex. The company, or the commission, must therefore

consider not only what is theoretically best, and financially expedient, but also what the public will stand for.

The present author inclines very much toward putting residences using current mainly for lighting, into a single class. Let us say that the shape of the daily load curve is about the same for all such customers. Let us then determine as closely as possible the average actual cost to the company of making and maintaining a connection to a residence, including interest and depreciation on that equipment used solely by one customer and not available for any other customer. Then let us include the cost of bookkeeping, meter reading, etc., and possibly including the cost of magnetizing current. Then let each customer's bill have printed on it this sum as a "connection charge," irrespective of whether any current be consumed inside the house or not. The usual "minimum charge" may be eliminated, the cost per K.W.H. lowered a little, and the customer may buy, and pay for, as little as a single K.W.H. or as much as he likes. With this system it really makes but little difference in the cost to the company per K.W.H., whether the customer uses 10 or 100 K.W.H. per month. It is fair to say that the idea of a connection charge does not always appeal to the public, but if it is best probably the public can be educated to accept it. The use on the other hand of schedules based on "connected load," or on "active rooms," are of great advantage only in case the shape of the load curve can be changed by their use or in case the use of current for other than lighting purposes can be considerably increased. It would be of interest to know just what effect the use of these two systems, where they are in use, has had on the shape of the load curve of the average householder. If any engineers present have exact data bearing on this feature, it is to be hoped that they may give the rest of us the benefit of it. The subject is of the greatest importance, and a few reliable figures are worth a good deal of theorizing. Of course there must be a reduced price for large consumption, and to take care of this reduction the "block system" now in use in several places seems at least one of the best methods. With the block system each customer of a given class pays a given rate for the first block, a less rate for the second block, a still less rate for the third block, and so on. The method is quickly understood by the public and is well liked where used.

For a householder whose use of electricity is not mainly for lighting, it now seems to be the general practice to install a second meter, and charge a different rate. Perhaps that is the most satisfactory thing to do at present. It seems quite possible that in the

future such customers may be given a combination of a maximum demand meter with a two-rate clock-controlled meter. We must perhaps wait for the inventor to make this sort of thing practicable. It is rather obvious that if a correct and simple system of charging could be introduced that would lead customers generally to use current for refrigeration, electric cooking, etc., and would also insure that current were not used for such purposes during the peak load hours, the result would be greatly to the advantage of all. The weak point of all systems that simply encourage consumption is that the increased consumption in some part, and perhaps in large part, may be at the extreme peak for the plant.

When we leave the field of residence supply, and consider the proper charge for the almost innumerable other uses of electricity, we find that it is rather customary to divide industries into classes, and to make one rate say for laundries, another rate for brick yards, another rate for planing mills, etc. The rates for different industries seem mostly to have been made in the past on the basis of what the traffic will bear. Thus for a planing mill, where steam is useful for treatment of material, and where there is enough refuse wood to be disposed of so that fuel may cost little or nothing, the rate is likely to be very low. The rate for an apartment house is sometimes considerably lowered if the owner has an isolated plant ready for use. Of course discrimination between different consumers of a single class, such as apartment houses, is now largely done away with by regulation. It is still a very serious question just what classes of business should have separate rates, and what those rates should be. The author is inclined to believe that it is not so very uncommon for electric companies to take business along some particular line at a rate that, if all factors could be correctly figured in, would be shown to produce a net loss. There are frequently cases where an individual consumer really can make his own electricity for a less cost than the company serving his district can afford to sell it to him. There are very many more cases where the consumer thinks he can make his own electricity much cheaper than he really can make it. When the solicitor of the company, who is out to make a record, finishes his negotiations with such a man, they may have arrived at a rate at which the company might better not take the business. In such a case if a rate-fixing commission takes charge and, by laying down general rules, in effect raises the rate to such favored consumers, the result is likely to be a loss of business, and a feeling on the part of the company that it has been injured by "theoretical" rate-fixing. As a matter of fact the company may instead have been benefited.

It seems to the writer that the effort in apportioning charges among various classes of consumers should be to make each class pay as nearly as possible the same rate of return to the company on such part of the company's plant and working staff as serves the particular class considered. Proper weight, however, must be given to the value of the service to the consumer, and to the price that the consumer can afford to pay. Certain classes of users may be able to pay more than other classes for a K.W.H. consumption that may cost the company the same in either case. Such differences in value of service should be considered, as well as differences in cost to supply service. The writer also believes that generally speaking, too much attention is given to total consumption in kilowatt hours, and too little attention is given to load factor, and especially to the shape of the load curve, and that far too little attention is given to classes of load that may exist, or may be developed, and may be kept almost wholly off peak. It should be noted that a customer with an irregular load curve, but who is wholly off peak, will probably be more desirable, at least on an extensive system, than a customer with 100 per cent load factor.

The writer would favor the block system of charging in nearly all cases, and, where the size of the bill would justify it, would like to see a maximum-demand meter used. In that case a possible arrangement of blocks and of bills might be something as follows: (the figures are used for illustration only):

Form of Bill			
Consumption for month: K.W.H.	Month of.....		
	Days	Max. demand	Product
7320 K.W. hours	30	88.76	11402580
2880 K.W.H. @ 5c.....			\$144.00
2880 K.W.H. @ 2½c.....			72.00
1560 K.W.H. @ 2c.....			31.20
7320 K.W.H. for total sum of.....			\$247.00

The preceding bill is for a customer having a monthly total load factor of a little under 10 per cent. For the same total consumption but a better load factor we may assume additional illustrative rates and construct a bill as follows:

Form of Bill			
Consumption for month: K.W.H.	Month of.....		
	Days	Max. demand	Product
7320 K.W. hours	30	30.38	28001140
1140 K.W.H. @ 5c.....			\$ 57.00
1140 K.W.H. @ 2½c.....			28.50
1140 K.W.H. @ 2c.....			22.80
1140 K.W.H. @ 1¾c.....			19.95
1140 K.W.H. @ 1½c.....			17.10

1140 K.W.H. @ 1¼c	14.25
180 K.W.H. @ 1c	4.80
<hr/>	
7320 K.W.H. for total sum of	\$161.10

The preceding forms, of course, are simply equivalent to combining the block system with the method already used rather extensively of charging a rate depending upon the "hours use of maximum demand."

To a limited extent it is possible to take care of differences in the time of day of maximum demand, by varying the rate for various classes of service. Some businesses require current only during definitely fixed hours. There are objections to such classifications, and indeed to complications of any sort in the rate. It seems to be generally conceded however that it is going to be necessary to include either maximum demand directly measured, or to introduce some quantity such as installed capacity, or active installation; quantities which are assumed to be approximately proportional to maximum demand. As maximum demand meters are not excessively expensive it would seem that their use should be favored where possible.

It should be noted that it is not really maximum-demand of any particular customer that seriously affects the company. The company is only seriously affected by the coincidence of time of the maximum demands of a large number of customers. If a given consumer has his maximum-demand off peak, the size of that demand is not a serious matter. Perhaps we may come to a combination of clock and maximum demand meter, and base the bill upon equivalent hours' use of that maximum demand or average maximum demand, which occurs during peak load of the plant, paying no attention to what the maximum demand may be at other times of day.

A rate-fixing commission should meddle as little as possible with such rate details as have been mentioned under the present heading, although a commission should be ready to advise upon such matters at the request of any company. A commission's advice ought to be very valuable, for the commission should be in a position to know what is being done all over the country, while the officers of a single corporation may be so occupied with administrative detail as to have little time for investigations. While a commission therefore should be prepared to give voluminous and detailed advice upon request, it does not seem proper that a commission should interfere in detail matters between a company and its customers except where such interference is really necessary for the protection of the public.

Unsuccesssful Utilities

The problem of the unsuccessful utility, or of the utility that has been unsuccessful

in its early years but afterwards becomes self-supporting or better, is very puzzling. There are certain general features, however, that seem usually to be overlooked. In the first place it will be generally recognized that as an abstract proposition it is no part of the functions of government to prevent its individual citizens from losing money (except by preventing fraud and through the general dissemination of information and advice, etc. The citizen who invests unwisely in a public utility is no more entitled to ask the government to collect his loss from the community, than is the citizen who invests unwisely in a grocery store. To go a little farther, if investors misjudge a situation and create an enterprise that would be profitable ten years later, such investors are not entitled to collect from the future community the early losses that came from their own poor judgment. This does not at all mean that a company is not to be allowed a reasonable time to establish itself, or that the reasonably determined cost of establishing a business is not to be capitalized, and paid for by the public. Such costs should be so capitalized and paid for. There should be a clear distinction made between the cost of establishing a successful business, and the losses following an ill-conceived or premature enterprise. This is an extremely important matter, and should have much more attention than has generally been given to it. A commission must be liberal in allowances for building up a business, or projects will not be undertaken. At the same time a commission must guard carefully against making the public pay for such misjudgment as in any but a public service enterprise would simply mean personal loss to the man who has misjudged.

In every rate discussion it is pointed out that an investor in public service securities must have an increased return because of the risk that he runs of losing his money. This is perfectly correct. The same gentlemen who bring out this idea of excess compensation for risk, will not infrequently in effect take the position that rate-making bodies must see that no investor in any public utility is permitted by any chance to lose money. The two propositions are incompatible. An investor should not be compensated for risk unless there is risk. If the

government makes the rule that such investors must never lose, then there is no risk in the investment, and no occasion for excess compensation. The fact is that we must recognize frankly that there is a risk to any business and that risk is the risk of losing money. This means that some of the people who engage in that particular kind of business are going to actually lose money. Also it means that the excess compensation to those who succeed must seem to the investor to bear a reasonable relation to the chances of failure, i.e., to the proportion of total money in similar enterprises that in fact is lost.

Now for an enterprise that is in advance of the development of the community, and therefore must necessarily be losing money, and where rates based on proper return to capital, provision for depreciation, etc., are uncollectable, or are more than the community will pay before going without the service, the reasonable rate seems to be "what the traffic will bear." That is to say, the rate must be the one that will bring in the most possible revenue. The corporation in such case should be allowed to exercise its own judgment in fixing the rates, the commission only acting as an advisor.

When the community catches up to the utility. It seems to the writer perfectly just that the commission should then value the tangible and intangible values (as depreciated or appreciated), including such a "going value" as would apply to such a business if built up in a community that might support it. It seems perfectly just that revenues and rates be then based on the appraised value. As to the excess losses of early years, or the losses due to depreciation not having been met in earlier times, those losses should not in the case outlined, be forced on the public. It is not recommended that there should be any abrupt change of rates at any particular period of growth, but that as the community becomes able to support the utility such a gradual change in rates should occur as will eventually bring the public and the utility into the same financial relationship as they would have enjoyed had the utility been constructed at a time when the public was ready for it, and had it therefore been successful from the start.

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